

# (12) UK Patent Application (19) GB (11) 2 222 821 (13) A

(43) Date of A publication 21.03.1990

(21) Application No 8920219.6

(22) Date of filing 07.09.1989

(30) Priority data

(31) 8822033

(32) 20.09.1988

(33) GB

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(51) INT CL<sup>4</sup>

B65D 53/02 41/02

(52) UK CL (Edition J)

B8T THCS T13A

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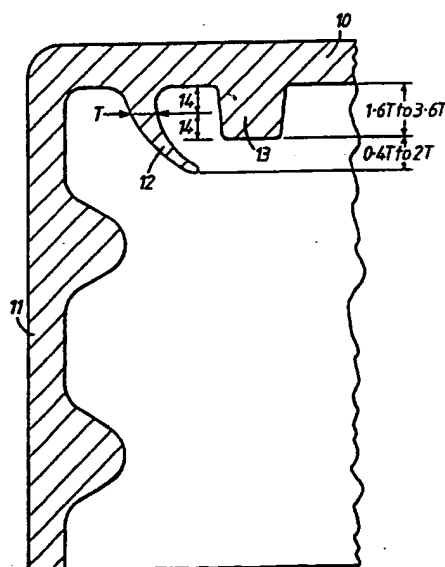
(58) Field of search

UK CL (Edition J) B8T TCA TCP THCS THRS

INT CL<sup>4</sup> B65D 41/00 41/02 41/04 41/06 41/08 53/00  
53/02

## (54) Closures for releasably sealing containers

(57) A closure for a container having a top portion (10) and a depending skirt (11) for cooperating with the container neck has means for sealing with the container neck, in the form of an annular claw-type sealing element (12) and a juxtaposed stop projection (13) for limiting deformation of the sealing element (12) to minimize loss of resilience thereof. The stop (13) projects from the underside of the top portion by an amount in the range 1.6T - 3.6T and the sealing claw (12) projects beyond the stop (13) by an amount in the range 0.3T - 2T. T is the wall thickness of the claw (12) at a position midway down the stop (13).



CLOSURES FOR RELEASABLY SEALING CONTAINERS

This invention relates to a closure having a top portion and a skirt depending therefrom for cooperating with a neck portion of a container by means of a screw thread with resilient, annular sealing means being provided on the top portion for sealing against the upper rim of the neck portion of the container when the closure is firmly applied to the container neck portion.

Such a closure is known, for example, from GB-A-788,148 wherein the sealing means is in the form of an annular element which curves inwardly in the downward direction and has a wall thickness which progressively reduces towards the free edge of the sealing element to give it a claw-like form in cross-section. Such a sealing element will hereinafter be referred to as "a claw-type sealing element". As described in GB-A-788,148 the claw-type sealing element is squashed flat between the rim of the container neck and the top portion or crown of the closure to form a seal therebetween. However permanent plastic deformation of the sealing element can take place in practice under such load so that when a stacking load is removed or the cap loosens due to diametric expansion, the sealing element may not be able to maintain its sealing pressure on the rim of the container neck which is necessary to prevent leaks and cap rotation.

The invention seeks to provide an improved container closure having a claw-type sealing element and which is specifically adapted and constructed to minimize loss of resilience of the sealing element due to deformation beyond the elastic limit of the plastics material used.

The invention provides a closure for a container, comprising a top portion, a skirt depending therefrom for

cooperating with a neck portion of the container, and sealing means integral with the closure top portion for sealing against the upper end surface of the container neck portion, said sealing means including a resilient claw-type sealing element and a stop means depending from the underside of said top portion to engage, in use, the upper end surface of the container neck portion thereby to restrict deformation of said sealing element, wherein the stop means projects from said closure top portion by an amount in the range  $1.6T - 3.6T$  and the claw-type sealing element projects downwardly beyond the stop means by an amount in the range  $0.3T - 2T$ , for example in the range  $0.4T - 2T$ , where  $T$  is the wall thickness of the sealing element measured horizontally, that is at right angles to the thread axis, at a level half way between the bottom surface of the stop and the underside of the closure top where it joins the claw seal which as it may not be the same at both sides of the claw, is further defined as the lowest level of the closure underside adjoining the claw seal or its root radius.

Said stop means is preferably in the form of an annular ring extending within and in juxtaposition to said claw-type sealing element.

A stop means having the constructional proportions specified in accordance with the invention provides a means specifically adapted to prevent the deformation of a claw-type sealing element beyond its elastic limit in order to maintain the required sealing function of the sealing element when a top load is removed from the closure or the cap loosens due to diametric expansion.

An embodiment of the invention will now be described by way of example and with reference to the accompanying drawing which is a fragmentary cross-sectional view through a closure embodying the invention.

Referring to the drawing, a closure in accordance with the invention, in the form of a cap for cooperation with the threaded neck portion of a jar, is moulded from a suitably resilient plastics material such as polypropylene. The cap

comprises a planar top portion 10 and a tubular depending skirt 11 which is internally screw threaded for threaded engagement with the neck portion of the jar. The cap top portion 10 is provided on its underside, with annular sealing means for sealing against the upper end surface of the neck portion of the jar.

The sealing means comprise a claw-type sealing element 12 which projects downwardly from the underside of the top portion 10. At the root portion of the sealing element 12, its inner and outer curved surfaces join the planar undersurface of the top portion 10 with respective blend radii.

An annular load stop member 13 is also provided on the underside of the closure top portion 10 at a location within the claw-type sealing element and in juxtaposition therewith. When the cap is tightened onto the threaded neck portion of the jar, the claw-type sealing element 12 engages the upper end of the neck portion to seal therewith and is resiliently deformed by such engagement. The resilient deformation of the sealing element 12 is however controlled by the depth of the load stop 13 which is of such bulk that it is substantially incompressible when engaged by the upper end surface of the neck portion of the jar.

In accordance with the invention, the following dimensional relationship is established between the claw-type sealing element 12 and the load stop member 13 in order to achieve a proper functioning of the sealing element 12 by preventing excessive deformation thereof in operation. The load stop member is constructed to project downwardly from the underneath surface of the closure top portion 10 by an amount in the range  $1.6T - 3.6T$  and the sealing element 12 is designed to project downwardly beyond the load stop member 13 by an amount in the range  $0.4T - 2T$ , where  $T$  is the wall thickness of the sealing element measured horizontally at a level equi distant between the bottom contact surface of the stop and closure underside where it joins the claw seal root radius, i.e. spaced therefrom by an

equal distance (14). Although in the specific example given above the range  $0.4T - 2T$  has been selected for the extent of downward projection of the sealing member (12), this downward projection may be in the range of  $0.3T - 2T$  in other embodiments of the invention.

When the jar is filled and the cap applied thereto, the sealing element 12 is compressed against the upper end surface of the neck of the jar by virtue of the cooperating screw threads on the skirt 11 and the neck of the jar and the torque applied during the clamping operation. Capped jars may be subsequently stacked vertically, whereby a considerable top load is exerted on the jars at the bottom of each stack which normally would cause overdeformation of the cap seal 12 which, when the top load is removed, results in the seal no longer contacting the end surface of the jar neck portion and the cap becoming loose allowing leakage and cap rotation. This is prevented by a construction in accordance with the invention which is specifically adapted to prevent or greatly minimize any likelihood of permanent deformation of the claw-type sealing element 12.

CLAIMS

1. A closure for a container, comprising a top portion, a skirt depending therefrom for cooperating with a neck portion of the container, and sealing means integral with the closure top portion for sealing against the upper end surface of the container neck portion, said sealing means including a resilient claw-type sealing element and a stop means depending from the underside of said top portion to engage, in use, the upper end surface of the container neck portion and to restrict deformation of said sealing element, wherein the stop means projects from said closure top portion by an amount in the range  $1.6T - 3.6T$  and the claw-type sealing element projects downwardly beyond the stop means by an amount in the range  $0.3T - 2T$ , where  $T$  is the wall thickness of the sealing element measured horizontally, that is at right angles to the thread axis, at a level half way between the bottom surface of the stop and the underside of the closure top where it joins the claw seal which as it may not be the same at both sides of the claw, is further defined as the lowest level of the closure underside adjoining the claw seal or its root radius.

2. A closure for a container, comprising a top portion, a skirt depending therefrom for cooperating with a neck portion of the container, and sealing means integral with the closure top portion for sealing against the upper end surface of the container neck portion, said sealing means including a resilient claw-type sealing element and a stop means depending from the underside of said top portion to engage, in use, the upper end surface of the container neck portion and to restrict deformation of said sealing element, wherein the stop means projects from said closure top portion by an amount in the range  $1.6T - 3.6T$  and the claw-type sealing element projects downwardly beyond the stop means by an amount in the range  $0.4T - 2T$ , where  $T$  is the wall thickness of the sealing element measured horizontally, that is at right angles to the thread axis, at

a level half way between the bottom surface of the stop and the underside of the closure top where it joins the claw seal which, as it may not be the same at both sides of the claw, is further defined as the lowest level of the closure underside adjoining the claw seal or its root radius.

3. A closure as claimed in Claim 1 or Claim 2 wherein said stop means is in the form of an annular ring extending within and in juxtaposition to said claw-type sealing element.

4. A closure as claimed in any preceding Claim wherein said skirt has an internal screw thread for threadably engaging the neck portion of said container.

5. A closure as claimed in any preceding Claim wherein said claw-type element comprises an annular element which, in cross-section, curves inwardly in the direction towards its free edge and has a thickness which progressively reduces towards its free edge.

6. A closure as claimed in Claim 5 wherein the inner and outer curved side surfaces of said claw-type element join said underside of the top portion of the closure with respective blend radii.

7. A closure for a container, the closure being substantially as hereinbefore described with reference to the accompanying drawing.

